

# OPINION

About dissertation on a topic:

"Lag modeling of public finances through a stress test"

With author **PhD student Julian Hristov Voynov, No. D020219197,**

Department of Finance and Credit at EA „D. A. Tsenov“

From Prof. Stoyan Prodanov, PhD.

**Aim of the statement:** The statement is prepared by Professor Stoyan Prodanov, PhD, in connection with the defense of a dissertation for awarding of an educational and scientific PhD degree in the area of higher education: 3. Social, Economic and Legal Sciences

**Form of the PhD study:** Full-time PhD study

**Leading department:** Department of Finance and Credit in the Faculty of Finance

**Scientific supervisors:** Prof. Yordan Vassilev, PhD, Department of General Theory of Economics and Prof. Rumyana Lilova, PhD, Department of Finance and Credit in the Faculty of Finance at EA „D. A. Tsenov“

**PhD program:** "Finance, Money Circulation, Credit and Insurance (Finance)"

## **I. General opinion about the dissertation and assessment of its form and structure**

The present opinion corresponds to the normative requirements of the Development of Academic Staff in Republic of Bulgaria Act, the Development of Academic Staff in Republic of Bulgaria Implementation Regulation and those normative requirements applicable to AE "D. A. Tsenov" internal regulations.

The structure of the dissertation submitted for assessment consists of three chapters. In the introduction, the problem area of research is introduced as follows: relevance, object, subject, thesis, aim, tasks, methodology, information base, limitations, and innovation and uniqueness of the research.

The dissertation consists of 197 standard pages, of which 159 pages are main text and 20 pages - appendices. Its structure consists of an introduction, three chapters, a conclusion and a bibliography. The body text includes also 30 figures and 12 tables. The bibliography contains 70 sources. In the conclusion, the main results of the dissertation are presented. The bibliography is in accordance to the APA style. The main content and the bibliographic references provide grounds for establishing correct compliance with the requirements for bibliographic citation and bibliographic description. A declaration of authenticity and originality is attached. Three publications are prepared on the subject of the dissertation, including one study, one article and one scientific report.

For the **object** of the study, the author defines the main fiscal parameters, which are contained in the budget forecasts of the government, on the basis of which the consolidated fiscal program (CFP) of Bulgaria is prepared accordingly. The **subject** of the research is focused on the main methods for conducting a stress test on financial parameters and on the fiscal cyclically-adjusted budget balance.

The **research thesis**, which is supported and defined in the dissertation work, is formulated as follows: "To overcome the existing imperfections of the applied budget forecasts, caused by the "discrepancy" between the budget forecast and the actual execution of the budget, a suitable financial and econometric tool for making adequate political decisions, concerning the fiscal policy of the country, is the application of a stress test on an empirical model that includes economic and fiscal components and their lag.



The aim of the reserach is to apply a stress test on a model including economic and fiscal components and their lags in order to analyze to what extent the main fiscal variable - the cyclically-adjusted budget balance - reacts to a shock on the economic environment and how this shock affects on short- and long-term basis the cyclically-adjusted budget balance, and hence the nominal budget indicators.

The actuality of the topic stems from the growing need to forecast the budgetary parameters of a country concerning fiscal resources, but also from the need for implementation of policies, aimed at preventing economic and financial crises due to correct and timely reactions to external and unforeseen shocks. The study of the sustainability of financial systems and institutions has arisen not long ago, and this sustainability is supported by conducting stress tests on certain macroeconomic parameters - financial and fiscal balances of the studied countries. At the state level, one of the main parameters that financial institutions monitor, apart from debt, is the budget balance and especially the cyclically-adjusted budget balance (CAB).

The following **tasks** are set for implementation:

1. To systematize the main theoretical propositions for applying a stress test on financial variables and to trace their development through the various stages of their empirical application;
2. To implement a comparative analysis between the models used in the European Union, to calculate the main fiscal parameters impacting the fiscal policy and assess the adequacy of the results obtained from their application;
3. To present a comparative analysis between the results of the main model used by the European Commission to evaluate fiscal indicators, including its development and upgrades over the years and an alternative model that evaluates from a different angle the results of fiscal policy in the EU;
4. On the basis of an empirical model for estimating errors in budget forecasts, to perform a thorough analysis of the budget forecasts and their actual

executions based on historical data and to answer the question of whether errors made in budget forecasts are a consequence of insufficient information or have a discretionary nature due to political influences on forecasts;

5. On the basis of the Cobb-Douglas production function to build a model for calculating the cyclically-adjusted budget balance, which will be subjected to a stress test as a result of a shock on one of the main macroeconomic parameters underlying its calculation and to assess its response to the applied shock;

6. In order to verify the credibility of the proposed in the dissertation model to compare its results with those of the model used in MoF, evaluate their outcomes and make a comparative qualitative assessment.

## **II. A scientific and substantive evaluation of the research**

The dissertation is developed in the following three chapters. Chapter one "Theoretical Foundations and Development of the Toolkit for Stress Test on Financial Variables and on Public Finance" provides a theoretical overview of the field of the research. The main stages in the development of the stress test toolkit on financial, fiscal and macroeconomic variables and parameters are presented. Stress test models of public debt under economic downturns are key to proper forecasting. The main indicator for the condition of the state budget is the cyclically-adjusted budget balance on which the research is focused. The CAB determines to what extent the balance of the state budget is due to discretionary decisions under the government's fiscal policy, in contrast to the cyclical component, which reflects the influence of the automatic stabilizers laid down in the legislation.

Chapter Two "Empirical Analysis of Errors in Budget Forecast" evaluates the forecast errors that have been made over the years for the period 2000 - 2020 in public revenue, including total budget revenue and its components, namely budget



revenue from direct taxes, from indirect taxes and from social and health insurance contributions (SHIC). On the basis of the obtained results, an in-depth analysis of budget revenue forecasting errors is made, by means of a set of additional summary statistics and standard accuracy tests, using econometric analysis aimed at shedding light on the possible drivers of the inaccuracies in the budget revenue forecasts.

Chapter three "Model and Results of Stress Test Application on Public Finances" compares the result for the output gap according to the considered model in the dissertation and those from the model of the Ministry of Finance. The cyclically-adjusted budget balance (CAB) is a key indicator of the state and sustainability of the budget. Through the alteration of CAB, the government's discretionary actions regarding fiscal policy are identified. At the same time, CAB can be used as a main indicator of the state of public finances when they are subjected to a stress test, assuming a critical deterioration of the main economic parameters characterizing the development of the state.

In the conclusion the main results of the dissertation are presented. Key conclusions are drawn and directions for future research on the topic are formulated. Appendices and a list of cited literature (in APA style) are attached to the research.

### **III. Scientific and scientifically-applied contributions in the dissertation work**

On the basis of the dissertation, abstract and publications of the author, I would identify the following contributions of the research:

1. A contribution concerning theoretical reasoning and analysis. The relevance of the issue related to the application of a stress test on the main macroeconomic categories, in order to correctly forecast and evaluate the main budgetary and fiscal parameters, has been proven. On the basis of studied theoretical propositions

regarding the necessity and essence of the models applied in practice globally for forecasting and assessment of a cyclically-adjusted budget balance, the specific characteristics and limitations of their application are derived.

2. Methodological contribution. An empirical model for calculating errors in budget forecasts is built and the main reasons for their appearance are outlined. From the conducted empirical study of the deviations between the estimated and reported values of the fiscal budgets of the state (Bulgaria) for the period from 2000 to 2020, an in-depth analysis of the reasons that caused the identified deviations is carried out.

3. Methodological and practical contribution. Based on the Cobb-Douglas production function, a model for calculating a cyclically-adjusted budget balance is constructed and a stress test is conducted on one of the main macroeconomic parameters to check the reaction of the CAB.

4. Contribution to the practical application. On the basis of a comparative analysis between the model presented in the dissertation and the MoF model, the credibility of the calculations and results are verified and the reasons for the occurred deviations between the estimated and reported values of the fiscal budgets are evaluated and analyzed.

#### **IV. Question on the dissertation**

1. What are the specific characteristics and advantages of Dynamic Stochastic General Equilibrium (DSGE) models that make them a better alternative for forecasting key macroeconomic and fiscal variables compared to other economic models used at national and European level? Could you suggest a conceptual framework and direction for constructing an even more sophisticated forecasting model, although this is beyond the scope of the study?

## **V. Summary conclusion and evaluation:**

The submitted dissertation for awarding the educational and scientific PhD degree **meets** the quantitative and qualitative requirements of the Development of the Academic Staff in EA "D. A. Tsenov" - Svishtov Regulation. The research possesses scientific and scientifically-applied results that represent an original contribution to the science. The dissertation demonstrates that the PhD student has in-depth theoretical knowledge in the research area and abilities for independent scientific research. All 3 publications are independent and support the main contributions and achievements in the work of PhD student Julian Voynov among the scientific and professional community.

Therefore, I strongly recommend that the educational and scientific PhD degree to be awarded to him in the area of higher education: 3. Social, Economic and Legal Sciences, professional field: 3.8. Economics, PhD Program "Finance, Money Circulation, Credit and Insurance (Finance)".

**23.02.2023 г.**

**Opinion prepared by::.....**

**/Prof. Stoyan Prodanov, PhD/**